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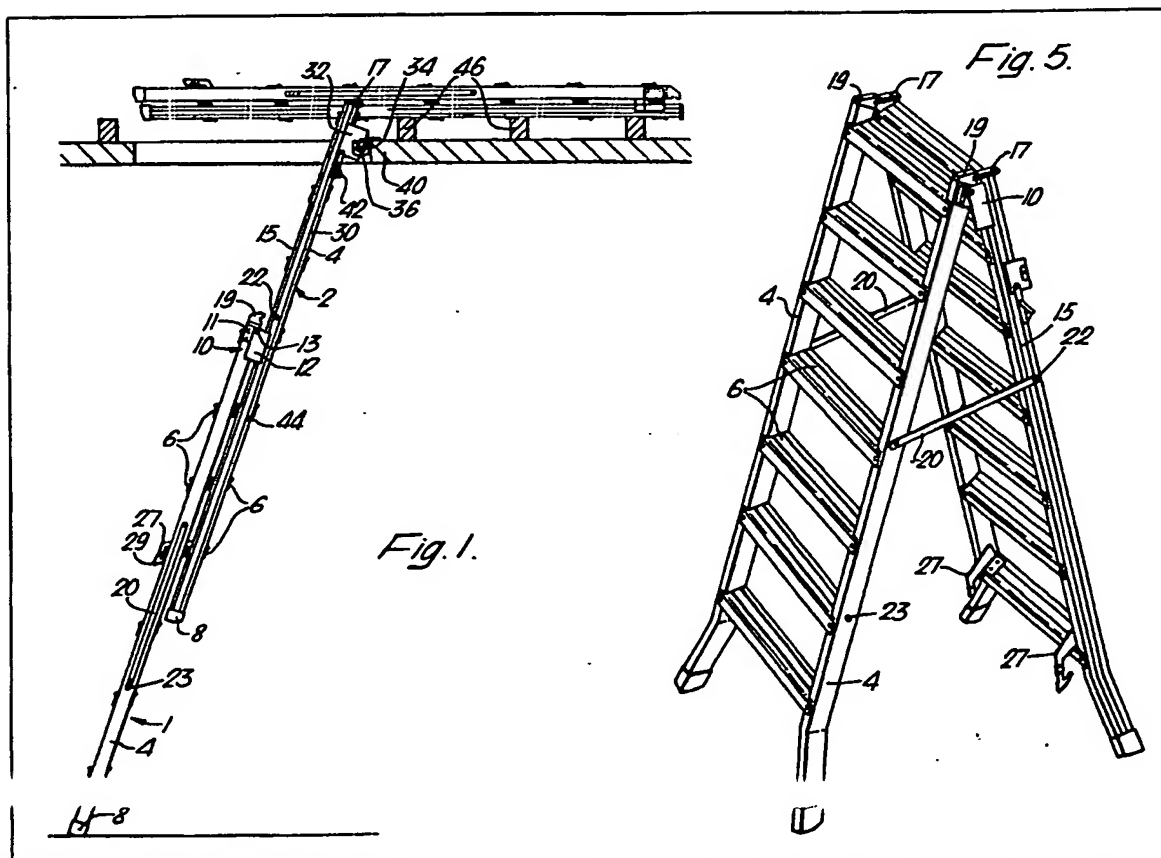
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(54) Three-way loft ladder

(57) A loft ladder that is demountable from the loft hatch for use as an extension ladder and that can also be converted into a stepladder has a pair of individual ladder members (1, 2) that are normally assembled in parallel sliding relationship. The uppermost ladder member (2) may be pivotally secured to hook means (36) fastened to the loft floor in the hatchway by means of a bar (34) mounted on a slide (32) on a stile (4) of the ladder member, but spaced behind the ladder member so that the close ladder can be swung up into the loft for storage. The bar and hook are so dimensioned that the bar is only remova-

ble from the hook when the ladder is near vertical. The lower ladder member (1) carries fixed to its upper end hinges (10) which are slidably mounted on the stiles of the upper ladder. Hooks (27) on the lower end of the upper ladder engage rungs of the lower ladder to keep the two ladders together in the loft ladder and extension ladder modes, while male and female blocks (17, 19) on the tops of the stiles of the two ladder members engage to restrain the hinges from sliding in the stepladder mode, in which a stay (20) is also used to maintain the separation of the ladder members.

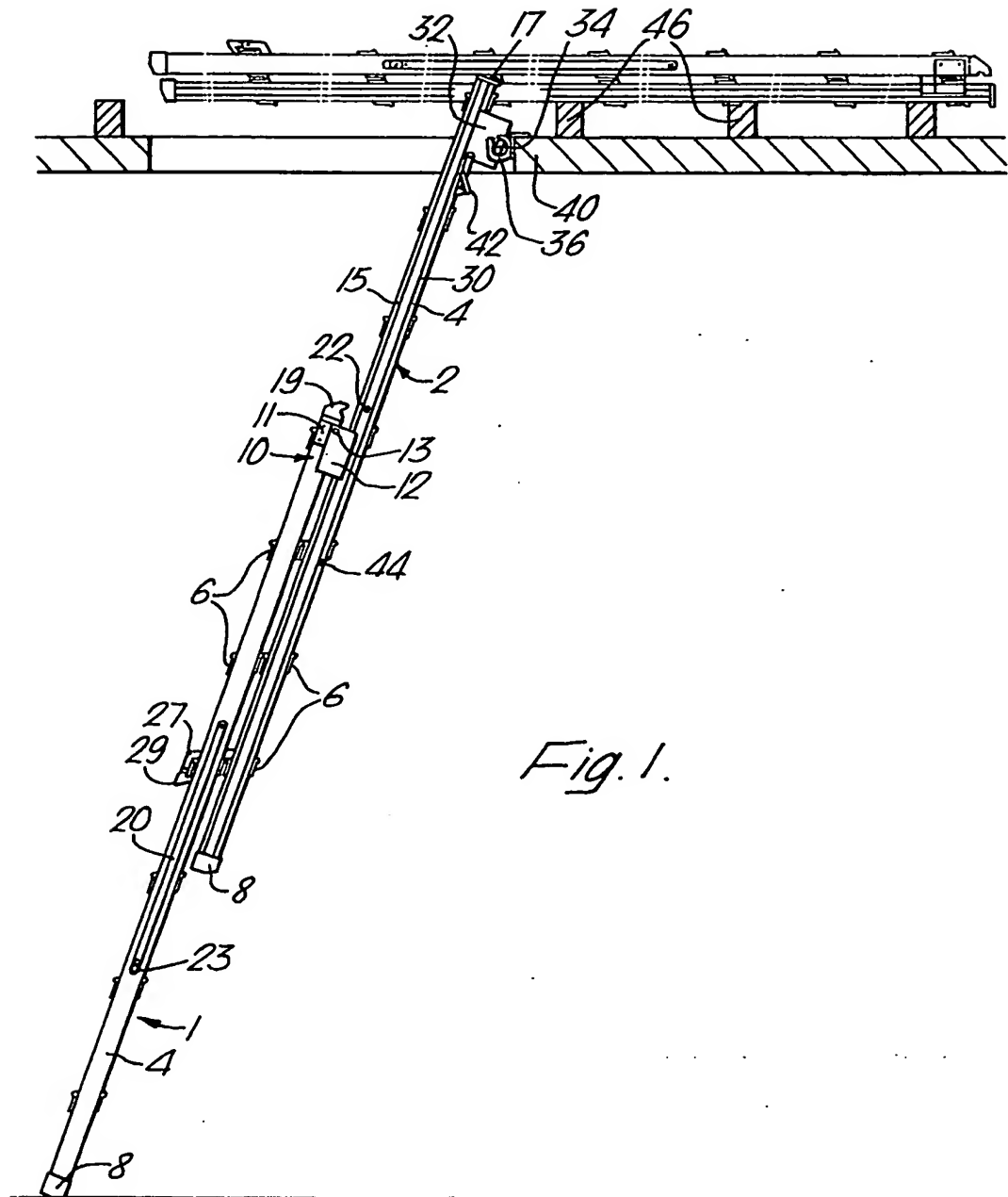


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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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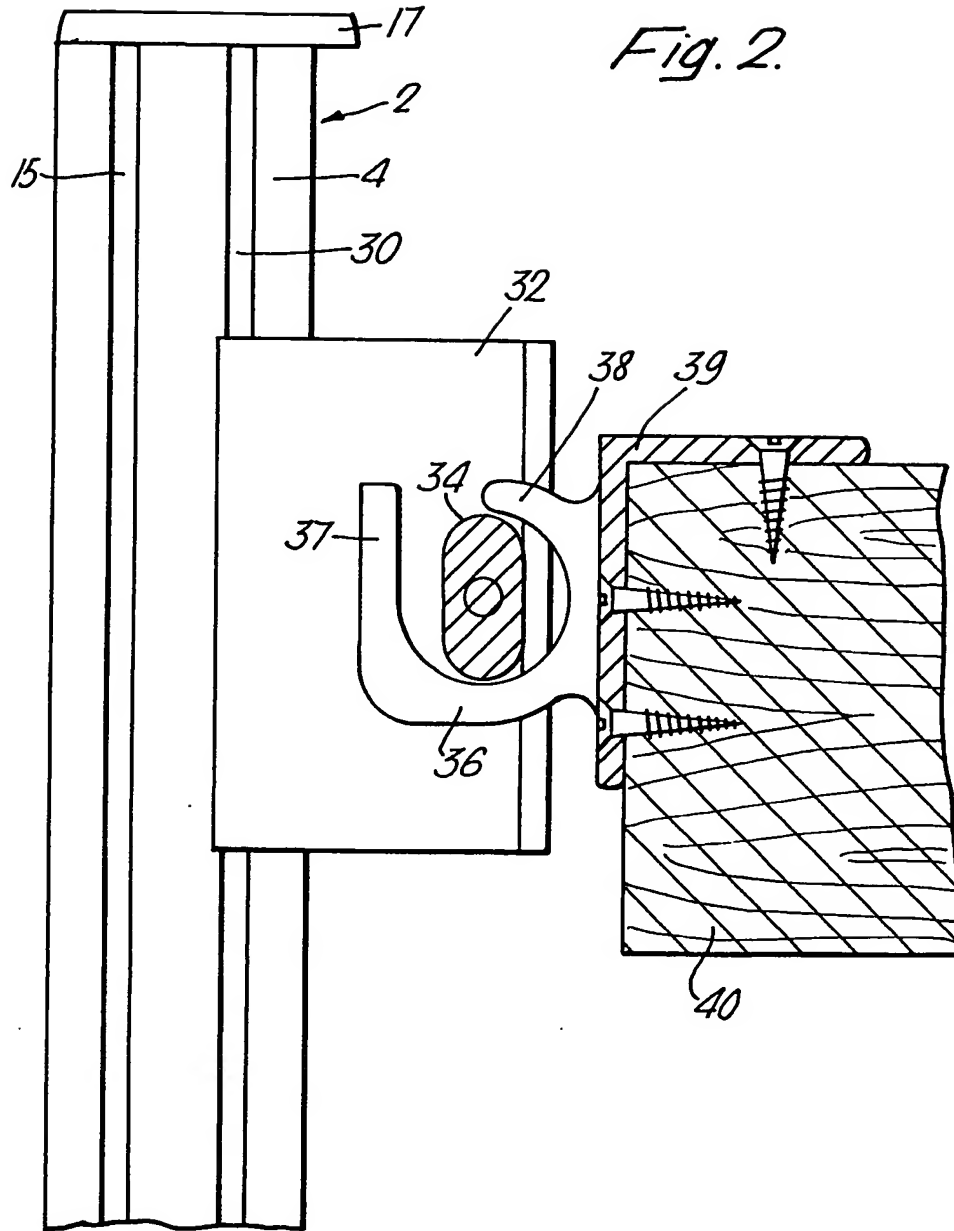


Fig. 3.

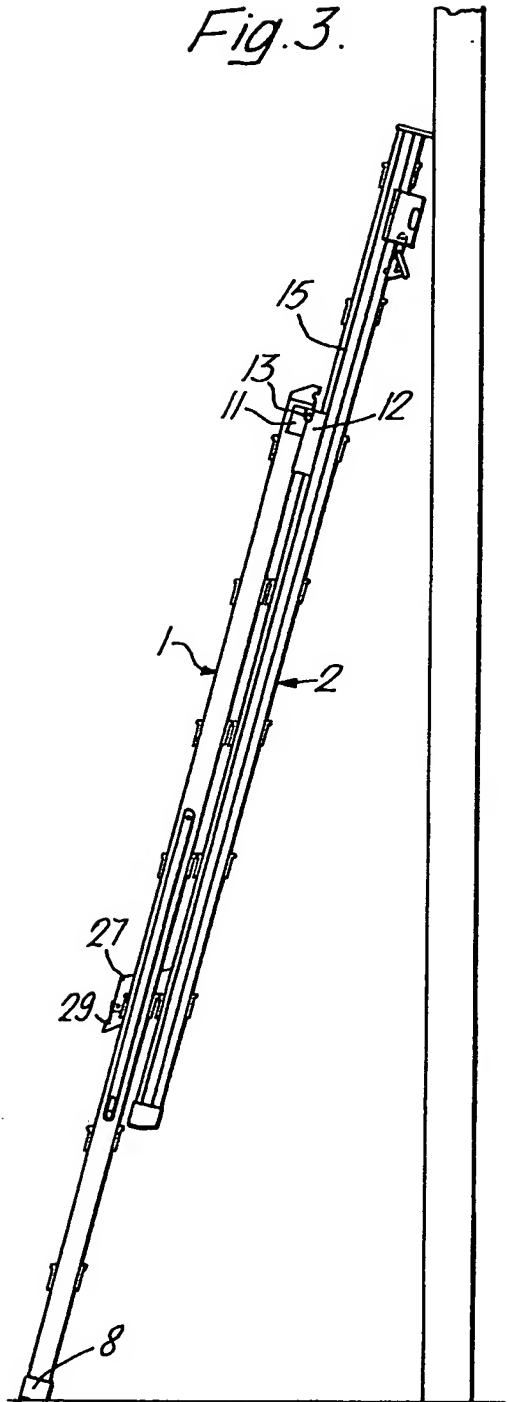
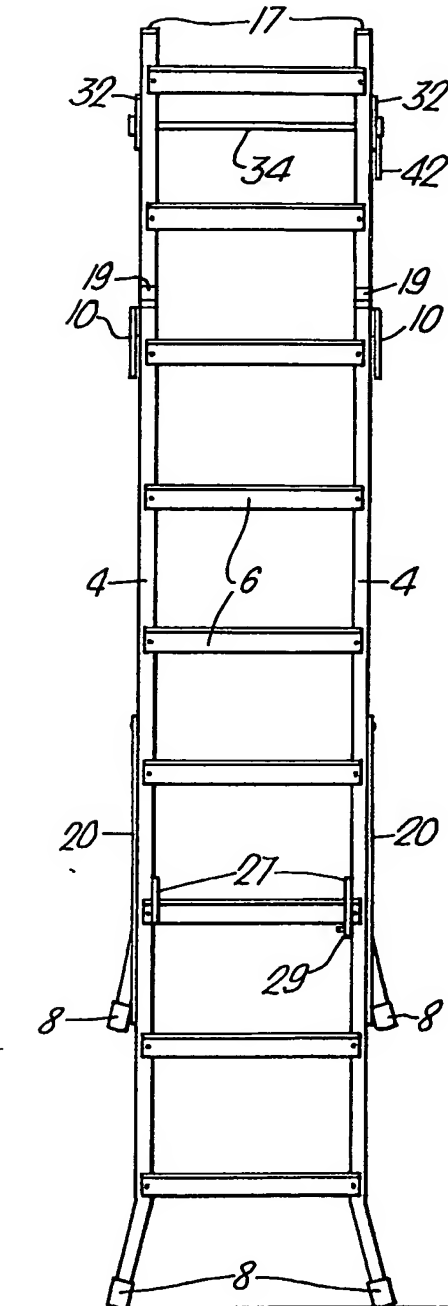
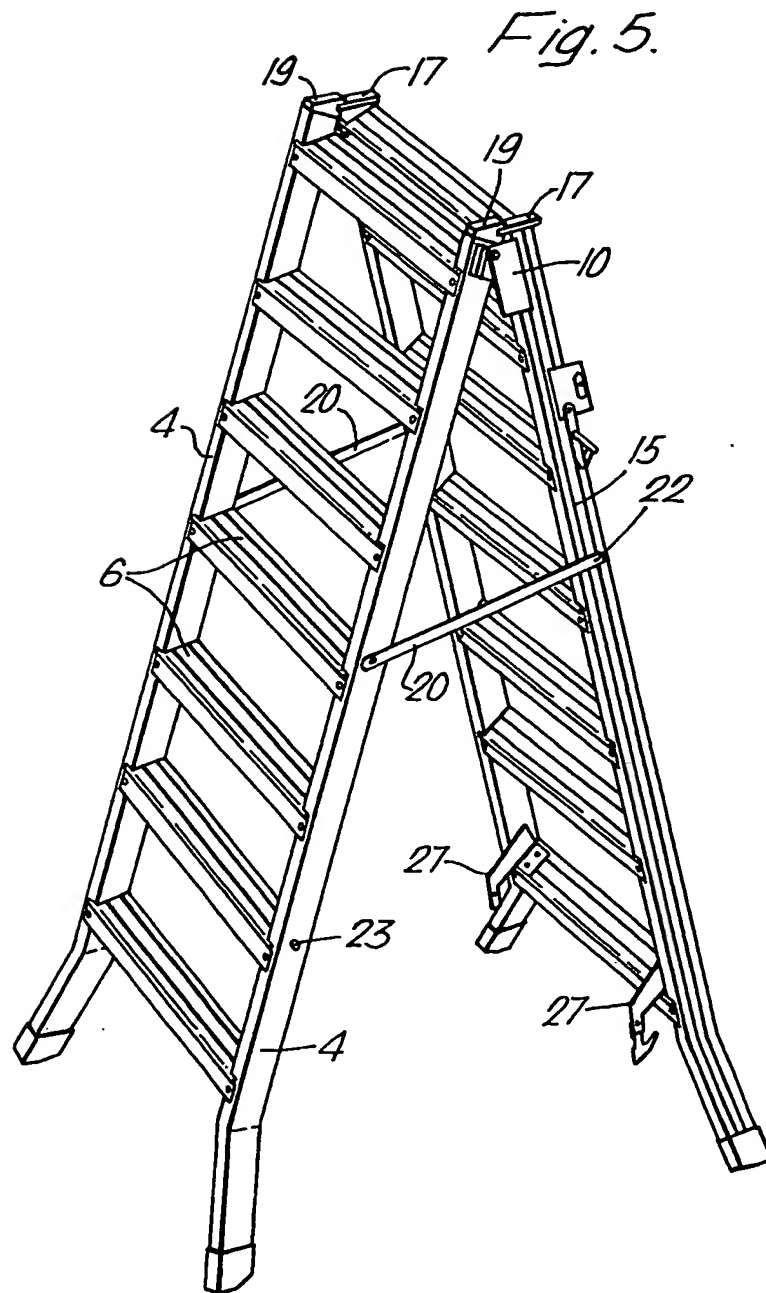


Fig. 4.



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Fig. 6.

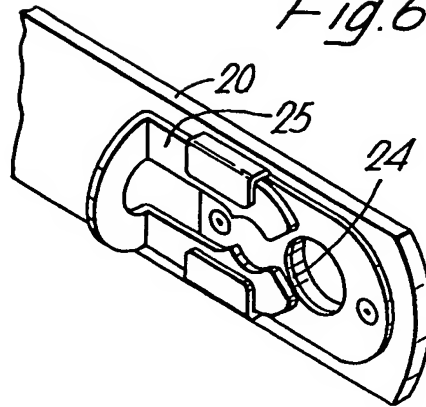
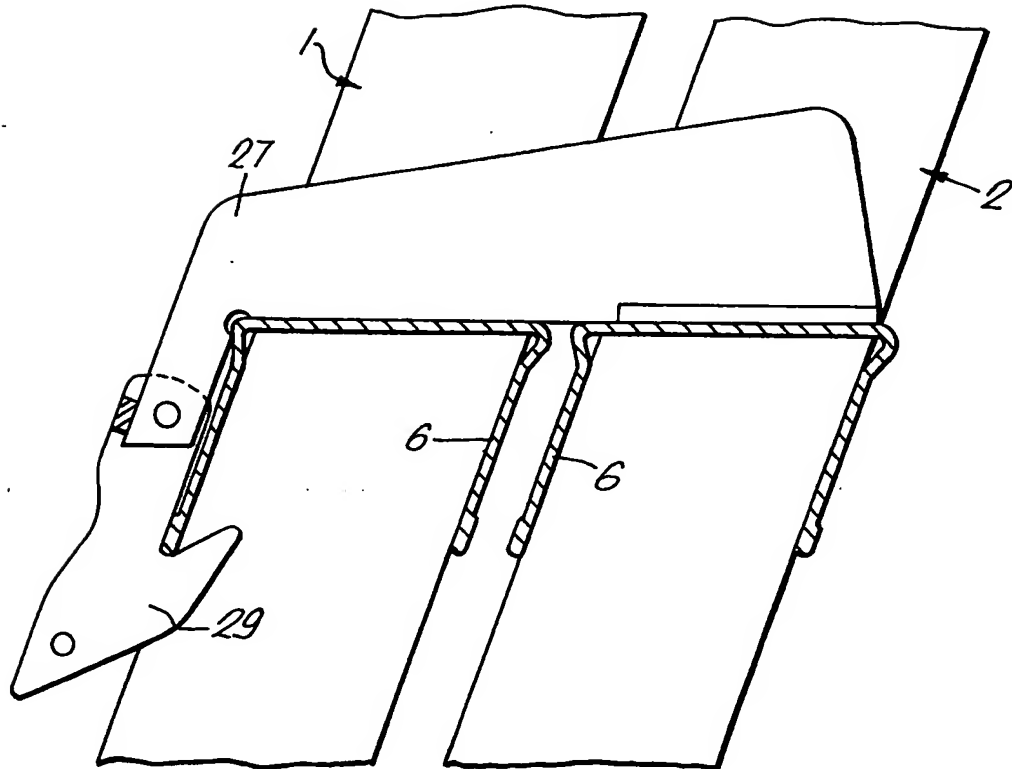


Fig. 7.



SPECIFICATION

Loft ladder

- 5 This invention relates to ladders, and particularly to loft ladders for use in gaining access to the loft of a building through a hatch in the floor of the loft.

- 10 A domestic loft is often used for storage purposes. It is well known to provide a permanently installed ladder which is fixed to the loft floor, or to the upper surface of a downwardly hinged trapdoor which closes the loft hatch, and which can be let down to provide

- 15 means of access to the loft and which stows into the loft when the trapdoor is closed. According to the present invention there is provided a demountable loft ladder comprising an extension ladder having a plurality of
- 20 individual ladder members and retention means adapted to be connected to the floor of a loft adjacent a loft access hatch and to detachably hold the one of the said ladder members that is to be uppermost when the
- 25 ladder is extended in use in position in the said hatch.

- A domestic loft ladder may typically be used as such only infrequently. A demountable loft ladder in accordance with the present
- 30 invention may however be used as an ordinary extension ladder wherever it may be needed, and is thus much more versatile than conventional loft ladders.

- The plurality of individual ladder members
- 35 may be assembled in lockable parallel sliding relationship to form the extension ladder. The members may be lockable by latch means mounted on one ladder member and engageable with a selected one of the rungs on an
- 40 adjacent ladder member.

- The retention means may be slidably mounted on the said one ladder member, so that the extension ladder can be slid up into the loft when closed, for storage. Preferably,
- 45 the retention means comprises a pivotal connection between the ladder and a part of the retention means which is adapted to be fixed to the loft floor, whereby the closed ladder can be pivoted to a horizontal storage position
- 50 within the loft. The said one ladder member may then be detachable from the floor of the loft by dismounting the said pivotal connection.

- The retention means may comprise a first
- 55 part connected to the said one ladder member and a second part adapted to be fixed to the loft floor, the first and second parts being detachably interconnectable. The first part may be slidable along a stile of the said one
- 60 ladder member.

- The pivotal connection may take many forms. In a preferred embodiment of the invention, it comprises a hook and a bar or like
- 65 member receivable within the hook. Preferably the hook is so dimensioned internally, and the

- bar or like member is so dimensioned externally, that the bar or like member can pass into and out of the hook only in a limited range of relative orientations. Specifically, the
- 70 bar may be removable from the hook when the ladder is generally vertical but not removable when the ladder is at an inclination in the region of 75° or greater to the horizontal, which is the normal inclination when a ladder
- 75 is being climbed.

- The hook is suitably fixed to the loft floor and the bar or like member connected to the ladder; the bar-like member may be provided by a rung of the ladder, but preferably it is
- 80 mounted on a slide on a stile of the said one ladder member and is spaced behind the ladder member. Such rearward spacing allows the closed ladder to be stored horizontally on joists comprising the loft floor while the hook
- 85 remains fixed to an edge of the access hatch at a level somewhat below or level with the tops of the joists.

- In a demountable loft ladder in accordance with the invention, the extension ladder may
- 90 be convertible into a stepladder, thus further enlarging the versatility of the ladder. A preferred extension ladder comprises first and second ladder members having a hinged connection between them, the hinged connection being in a fixed location with respect to the
- 95 first ladder member and slidable along the second ladder member. The ladder preferably further comprises means for restraining the hinged connection from sliding with respect to
- 100 the second ladder member when the ladder is in use as a stepladder, and stay means for maintaining a separation of the hinged first and second ladder members when the ladder is in use as a stepladder. The ladder may yet
- 105 further comprise engagement means to hold the first ladder member against and parallel to the second ladder member when the ladder is in use as an extension ladder.

- One embodiment of the invention is illustrated by way of example in the accompanying drawings, in which:—

- 110 *Figure 1* is a side elevation of the ladder in use as a loft ladder, showing both the extended and storage positions;

- 115 *Figure 2* is a vertical section to a larger scale of a detail of the ladder through the retention means;

- Figure 3* is a side elevation of the ladder in use as an extension ladder;

- 120 *Figure 4* is a front elevation of the ladder as shown in *Fig. 3*;

- Figure 5* is an isometric view of the ladder set up as a stepladder;

- Figure 6* is a partial vertical section to the
- 125 same enlarged scale through the ladder showing latch means for holding two adjacent ladder members locked together.

- prises a front or lower ladder member 1 and a
- 130 rear or upper ladder member 2, each being

formed from a pair of extruded aluminium stiles 4 and a plurality of broad aluminium treads or rungs 6 of an inverted channel-like section. The stiles are splayed at their lower ends and provided with slip-resistant feet 8 for increased stability.

The ladder members 1 and 2 are permanently connected by hinge members 10 which each comprise a fastening plate 11 fixed, for example by means of rivets, to a stile at the top end of the front ladder member 1, and a larger sliding plate 12 mounted in a first groove 15, running the length of a stile of the rear ladder member 2. The fixed plate 11 is connected to the sliding plate 12 by a pivot pin 13. The upper ends of the extruded stiles of the rear ladder member 2 are plugged with plain flat caps 17 which form the male parts of locking means used in the step ladder mode.

The upper ends of the stiles of the front ladder member are capped with blocks 19 which form the female parts of the locking means used in the step ladder mode and which each have a rearward facing notch adapted to engage the front edge of cap 17 on the adjacent stile of the rear ladder member when the hinge members 10 are at the upper end of their grooves 15 and the ladder is opened in its stepladder mode (Fig. 5). The ladder can be locked in this position by means of stays 20 pivotally mounted on the stiles of the front ladder member and engaged with pins 22 on the stiles of the rear ladder member.

Fig. 6 shows the locking mechanism provided on the free ends of the stays 20 for positively engaging the pins 22. When the opening 24 in the stay has been placed over the head of the pin, sliding clip 25 can be advanced and sprung into a circumferential groove on the pin to retain the stay on the pin.

Similar pins 23 are provided on the stiles of the front ladder member for retaining the stays 20 while the ladder is not being locked upon as a stepladder.

The lowermost rung of the rear ladder member 2 carries engagement means comprising a pair of hooks 27 directed forwardly and downwardly for hooking over a rung of the front ladder member 1, for the purpose of holding the two ladder members together when the ladder is being used in its extension ladder mode. As shown most clearly in Fig. 7, one hook 27 is provided with a catch 29 to snap under the front ladder rung and thereby prevent disengagement of the hooks from the rung when the rear ladder member is lifted, unless the catch is first released.

The rear ladder member 2, which is also the upper ladder member when the ladder is used as a stepladder, has on the outer side of each stile a longitudinal slot 30 behind and parallel to the groove 15. The

slots 30 each hold and guide a sliding plate 32 which projects rearwardly of the ladder. The two plates 32 are connected by a horizontal bar 34 so that, when the ladder member is vertical (Fig. 2), it has vertical front and rear and semicircular top and bottom faces.

When the ladder is in use as a loft ladder (Figs 1 and 2) the bar 34 is supported in two spaced apart hooks 36 carried on an angle bracket 39 screwed to an upper edge of a joist or trimmer 40 forming one side of a hatchway into the loft. Each hook 36 has a vertical limb 37 to give a generally U-shaped bearing surface for the bar; however, the upwardly-directed mouth of each hook is partially closed by an inner limb 38 extending from the bracket 39 towards the upper end of the outer limb, to leave an empty gap that the bar can only pass through when the ladder member 2 is vertical. Once in the interior of the hooks 36, the bar can be fully rotated, and accordingly the arrangement does not limit the inclination of the ladder.

The result is that the ladder can be lifted into and out of engagement with the hooks in the loft hatchway when, and only when, it is held vertically.

In order to stow the extended ladder into the loft from the in-use position shown in Fig. 1, the catch 29 is released and the upper, rear ladder member 2 is lifted to disengage the hooks 27 from the rungs of the lower, front ladder member 1, which can then be raised, clear of the hooks 27, until its lowermost rung can be brought up under catch 29 and secured thereby. The ladder is now at its minimum length. Continued lifting with the ladder inclined from the vertical raises the ladder on the sliding plates 30. When the ladder's point of balance has passed into the loft space, a spring catch 42 on one of the plates 30 engages with a stud 44 on the corresponding stile of the rear ladder member and locks the ladder against further sliding on its mounting. The ladder can now be rested horizontally on the joists 46 of the loft floor, and the hatchway closed with a trapdoor.

The ladder can be lowered by the reverse procedure: the trapdoor is opened, the foot of the ladder drawn down through the hatchway, the spring catch 42 released, the closed ladder lowered fully, the catch 29 released, the front ladder member lowered further until the desired extension is achieved, and the catch 29 refastened around the appropriate rung of the front ladder member.

If it is desired to demount the loft ladder, the toggle catch 42 is not released. Instead, the closed ladder is simply lifted in a vertical orientation to disengage bar 34 from the hooks 36. The demounted loft ladder, as can then be used as an extension ladder, as shown in Figs 2 and 4, or as a stepladder, as shown in Fig. 5.

CLAIMS

1. A demountable loft ladder comprising an extension ladder having a plurality of individual ladder members and retention means adapted to be connected to the floor of a loft adjacent a loft access hatch and to detachably hold the one of the ladder members that is to be uppermost when the ladder is extended in use in position in the said hatch.
2. A loft ladder as claimed in claim 1, wherein the plurality of individual ladder members are assembled in lockable parallel sliding relationship.
3. A loft ladder as claimed in claim 2, wherein the ladder members are lockable by latch means mounted on a first ladder member and engageable with a selected one of the rungs on an adjacent second ladder member.
4. A loft ladder as claimed in any one of the preceding claims, wherein the retention means comprises a first part connected to the said one ladder member and a second part adapted to be fixed to the loft floor, the first and second parts being detachably interconnectable.
5. A loft ladder as claimed in claim 4, wherein the said first part is slidable along a stile of the said one ladder member.
6. A loft ladder as claimed in claim 4 or claim 5, wherein the retention means comprises a pivotal connection between the ladder and a part of the retention means which is adapted to be fixed to the loft floor, whereby the closed ladder can be pivoted to a horizontal storage position within the loft.
7. A loft ladder as claimed in claim 6, wherein the said one ladder member is detachable from the floor of the loft by dismantling the said pivotal connection.
8. A loft ladder as claimed in claim 7, wherein the pivotal connection comprises hook means and a member receivable within the hook means.
9. A loft ladder as claimed in claim 8 wherein the hook is so dimensioned internally, and the member receivable therein is so dimensioned externally, that the member can pass into and out of the hook means only in a limited range of relative orientations.
10. A loft ladder as claimed in claim 9, wherein the member is removable from the hook means when the ladder is generally vertical but is not removable when the ladder is at an inclination in the region of 75° to the horizontal.
11. A loft ladder as claimed in any one of claims 8 to 10, wherein the hook means are adapted to be fixed to the loft floor and the member receivable within the hook means is a bar mounted on a slide on a stile of the said one ladder member and spaced behind the ladder member.

in any one of the preceding claims, comprising first and second ladder members having a

hinged connection between them, the hinged connection being in a fixed location with respect to the first ladder member and slidable along the second ladder member, whereby the extension ladder is convertible into a stepladder.

13. A ladder as claimed in claim 12, further comprising means for restraining the hinged connection from sliding with respect to the second ladder member when the ladder is in use as a stepladder, and stay means for maintaining a separation of the hinged first and second ladder members when the ladder is in use as a stepladder.

14. A ladder as claimed in claim 12 or claim 13, further comprising engagement means to hold the first ladder member against and parallel to the second ladder member when the ladder is in use as an extension ladder.

15. A demountable loft ladder comprising an extension ladder and convertible into a stepladder, substantially as herein described with reference to and as illustrated in the accompanying drawings.

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